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TECHNIQUE

The hollowing process of obturator prosthesis: A comparative analysis of direct and indirect techniques

Mohamed El Arbi Tahiri alaoui,[1,2*], Wissal Touzri,[1], Mohammed Azhari,[1], Saloua Hamzaoui,[2], Oussama Bentahar,[1]

[1]Department of Removable Prosthodontics, Faculty of Dental Medicine, Mohammed V University in Rabat, Morocco.

[2]Department of Dentistry, Mohammed V Military Training Hospital, hay Riad, Rabat, Morocco.

ABSTRACT

Maxillofacial prostheses, particularly obturator prostheses, play a crucial role in rehabilitating patients with maxillary defects. The larger the defect, the heavier the obturator, which can affect the retention of the prosthesis. While the weight reduction of obturators through a hollow design is well-documented in the literature, this article introduces an alternative, cost-effective, and precise method for hollowing prostheses. The indirect technique (IT) offers several advantages over traditional methods, including achieving an even thickness of acrylic resin and significant weight reduction, all without the need for additional materials. In scenarios requiring delayed hollowing of non-hollowed obturator prostheses, this article highlights the significance of adopting the direct technique (DT) in prosthodontic practice to improve patient outcomes and treatment efficiency. *(Int J Maxillofac Prosthetics 2025;8:2-6)*

Keywords

Palatal obturator, Maxillofacial prostheses, Cleft lip, Hollow bulb.

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Corresponding Author:

Dr. Mohamed El Arbi Tahiri Alaoui

Department of Dentistry, Mohammed V Military Training Hospital, Street Abderrahim Bouabid, Hay Riad, Rabat, Morocco.

Phone: +212650074648

Email: mohamedelarbi_tahirialaoui@um5.ac.ma

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AUDIO ABSTRACT

INTRODUCTION

In the context of cleft palate[1] and postsurgical scenarios of oral malignancy, especially oral squamous cell carcinoma, which represents more than 90% of all oral malignant neoplasms.[2] Oroantral or oronasal communications lead to difficulties in deglutition, impaired speech, and facial disfigurement. Prosthodontists play a vital role in rehabilitating such defects, as patients provided with obturator prostheses after surgery have reported good functional results.[3]

The size and shape of the obturator prosthesis may vary depending on the extent of the defect. However, greater extension of bulb portion inside the defect can add weight to the prosthesis, and gravitational forces may compromise the prosthesis retention.[4]

The obturator should be hollow and lightweight according to many clinicians,[5-7] However, there is some disagreement regarding whether to use closed or open hollow obturators. Although patients find both lightweight and well-tolerated, open hollow bulb obturators have the tendency to gather mucus, food, and fluids, which requires regular cleaning or repositioning of the vent.[8] Conversely, closed hollow bulb obturators sufficiently extend into the defect without accumulating fluid.[9] The obturator prosthesis can be hollowed out using a variety of techniques[10-12] and materials, including silicone, heat or light-cured resin, and others. Although they work well, some of those methods include using ice, salt, and sugar[13] within the bulb to keep it hollow during the polymerization process. This study describes the hollowing process of the one-piece closed obturator using direct and indirect techniques without involving any material inside the bulb.

TECHNIQUES

Case I

An edentulous 48-years-old female patient with unilateral cleft lip and palate who had undergone cheiloplasty. Wide palatal and alveolar clefts remained unilaterally, and she also exhibited velopharyngeal insufficiency. The patient complained

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that her current definitive obturator was heavy. Based on this fact, we have decided to provide her with two options: the first is to lighten her current obturator using the direct technique, and the second is to fabricate a new lightweight obturator using the indirect technique.

Indirect Technique (IT)

Use the current maxillary prosthesis as a support for the impression material (light silicone) to obtain the maxillary master cast. This cast is transferred onto the articulator to establish the central relation and vertical dimension of the patient. Subsequently, obtain the mandibular cast from the alginate impression.

Identify undercuts in the maxillary cast and fill them with wax (Fig. 1A).

Uniformly soften modeling wax and adapt it to the walls of the defect area and the supporting surface of the prosthesis (Fig. 1B).

Sculpt a bevel on the palatal surface encircling the bulb section's perimeter. (Fig. 1C).

Apply insulation varnish to the bevel before adapting wax onto it to create a lid for the hollowed section (Fig. 1D).

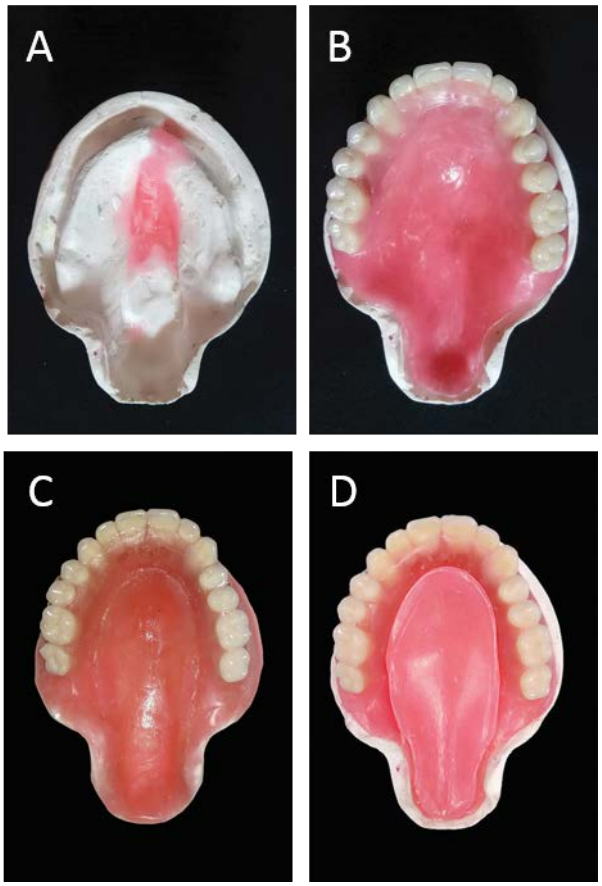

Fig 1. Indirect technique. **A**, Undercuts blocked with wax. **B**, Prosthetic teeth on the wax model. **C**, Bevel sculpted around the border of the bulb section on the palatal surface. **D**, Adapted wax lid.

Polymerize the prosthesis (Fig2. 2A, and 2B) and the lid separately using heat-cured acrylic resin.

Polish the polymerized lid and reposition it on the bevel to ensure a perfect fit.

Use self-cure acrylic resin to attach the lid to the prosthesis, and polymerize the resin in a dry, contained container to stop fluid from seeping into the hollow part of the device.[14]

Polish the prosthesis, including the lid, to get a smooth surface (Fig. 2C).

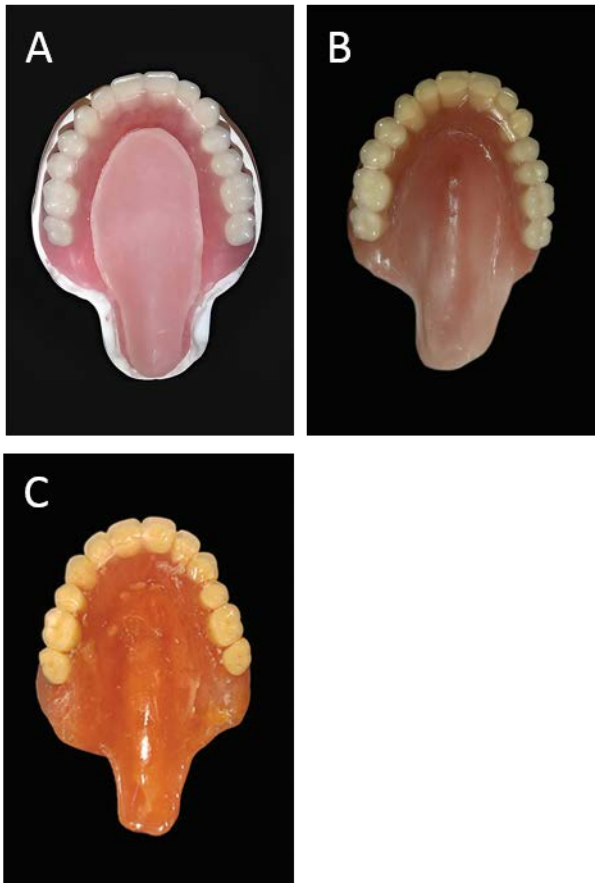

Fig 2. Polymerisation of the lid and the prosthesis. **A**, Repositioned polymerised lid. **B**, Prosthesis after polymerisation with heat-cure acrylic resin. **C,** Finished hollowed new prosthesis.

Direct Technique (DT)

Proceed the hollowing process of the current obturator prosthesis (Fig. 3A), just like the first steps of the technique described by Birnbach and Barnhard[14] until getting the prosthesis hollowed from the palatal aspect with the bevel of 2 mm wide and 2 mm deep around the border of the obturator section (Fig. 3B).

Adapt wax onto the bevel to create a 2 mm thick lid for the hollowed section.

Polymerize, check (Fig. 3C), and secure the lid to the prosthesis as described in the IT.

Finally, polish the prosthesis with pumice (Fig. 3D).

Lids utilized in both techniques were polymerized in the same flask (Fig. 4). The electronic balance revealed a 50% reduction in weight for current prosthesis (Figs. 5A and 5B).

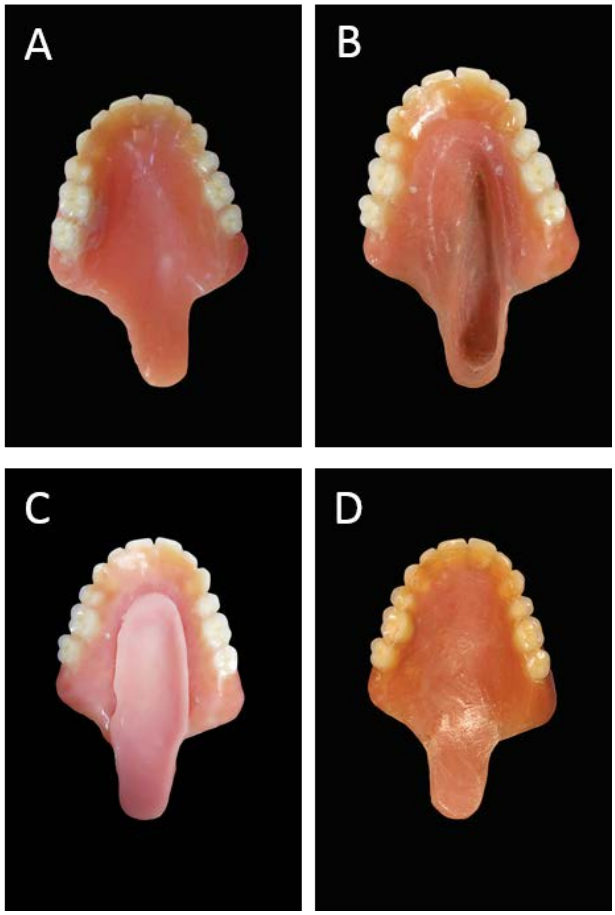

Fig 3. Direct hollowing process of the current prosthesis. **A**, Current prosthesis of the patient. **B**, bulb hollowed with carbide trimmers. **C**, Adapted lid after polymerisation. **D**, the hollowed polished prosthesis.

Case II

A 36-year-old male patient presented to the Department of Odontology with a left maxillary defect class IIb of Bentahar et al. classification,[15] following the excision of squamous cell carcinoma. The patient had previously been treated with a surgical obturator inserted on the day of maxillectomy. After the defect had healed, we decided to provide him with an interim hollowed obturator. Impressions were taken, and intermaxillary registration was done using conventional techniques. The hollowing process was performed using DT as described earlier.

The result for the second case was a nearly 20% reduction in the weight of the prosthesis (Figs. 6A and 6B). Another useful technique to assess the effectiveness of the hollowing process is by evaluating the translucency of light passing through thebulb portion of the obturator, as a well-hollowed obturator should allow light to pass through more easily (Fig. 6C).

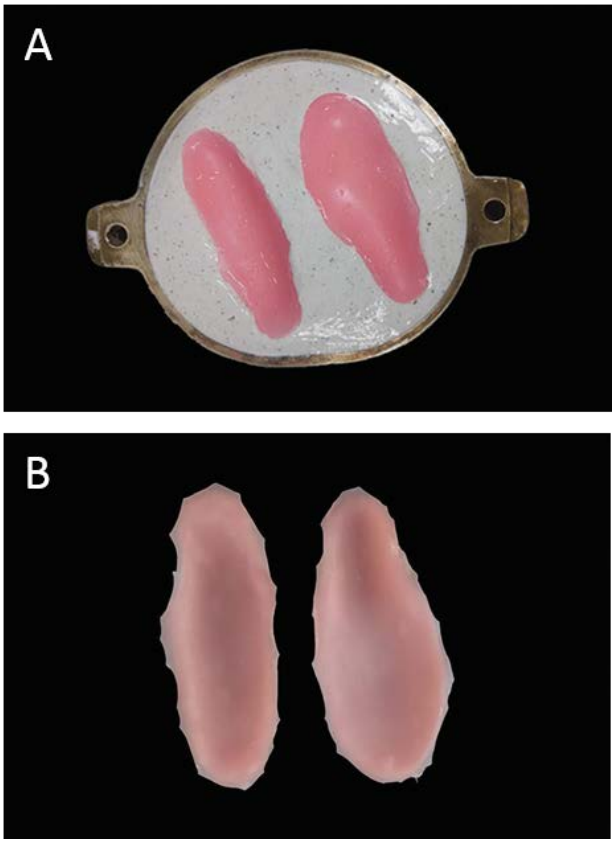

Fig 4. Polymerisation process of the two lids. **A**, Flasking process. **B**, lids polymerised with heat acrylic resin.

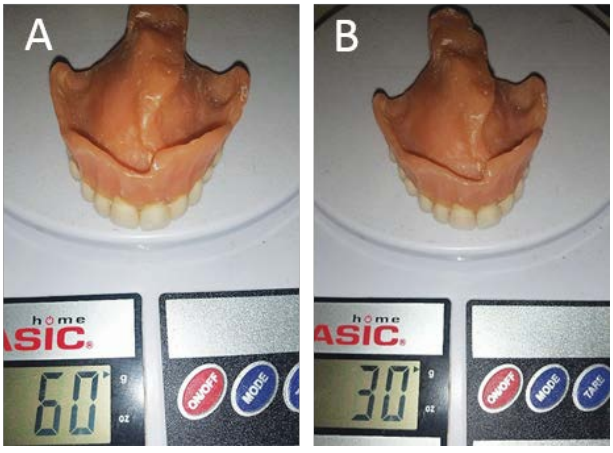

Fig 5. The weight of the case I obturator. **A**, Before the hollowing process. **B**, After the hollowing process.

DISCUSSION

Various materials for hollowing obturators face challenges such as uneven thickness, pressure endurance, curing temperature tolerance, and risks of resin infiltration, discoloration, and porosities.[13] Therefore, the DT and IT do not depend on any materials for the hollowing process.

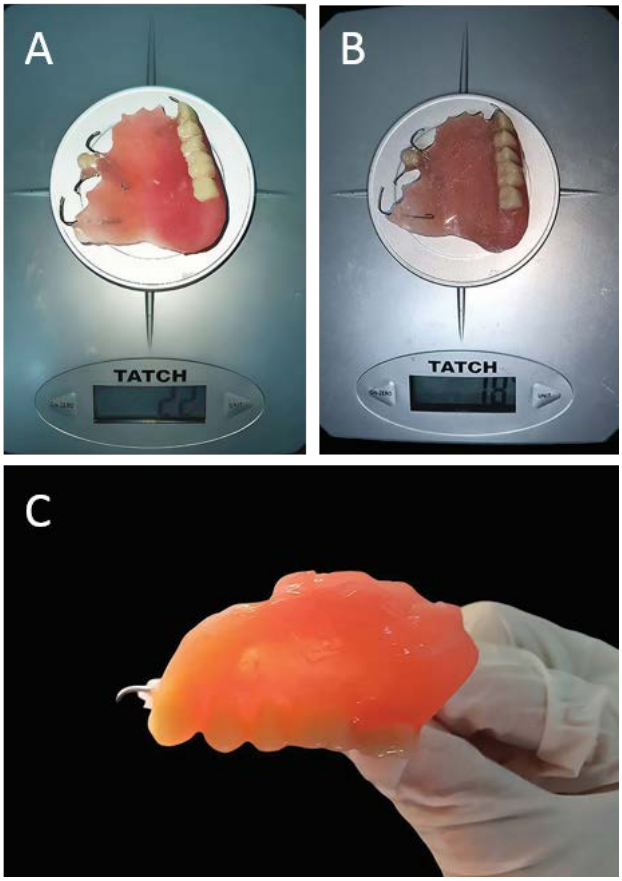

Fig 6. Hollowing process test for the second case. **A**, The weight of the obturator before the hollowing process. **B**, After the hollowing process. **C**, The translucency test.

The two-step polymerization process was adopted; however, we polymerized the two lids in one flask. For the IT, we suggest polymerizing the prosthesis and the lid in the same flask for time efficiency, although this depends on the shape and volume of the lid and the prosthesis. In the first case, the patient expressed greater satisfaction with her current hollowed prosthesis. However, this assessment remains subjective as the patient is already familiar with this prosthesis. Moreover, the new one requires many sessions for equilibration and adaptation.

The weight reduction of the prosthesis using the DT can be quantified by comparing the weight before and after the hollowing process. This cannot be achieved with the IT since the prosthesis is hollowed from the outset. However, the weight of the obturator prosthesis fabricated with the IT was slightlygreater than the weight of the obturator prosthesis hollowed directly. Although the weight reduction in the DT is still influenced by the practitioner's dexterity and the thickness of the acrylic resin left around the defect area, this thickness can be controlled more effectively with the IT. However, the DT allows for measurement and control using a vernier caliper during the hollowing process. This precision is crucial as any variation in thickness can negatively impact the flexural strength and mechanical properties of the obturator prosthesis.[13]

The second case aims to highlight the significant benefits of adopting a hollow design, even for an interim obturator. Despite their temporary nature, their comfort and functionality are crucial for the patient's quality of life during the healing and adjustment period.

CONCLUSION

The drawbacks of previous methods are mitigated by the IT. Without the need for extra material, it gives acrylic resin a uniform thickness and prevents distortion during mold closure. The DT has demonstrated its effectiveness, especially when postponing the hollowing of an obturator prosthesis that is not hollowed is necessary.

DECLARATION OF PATIENTS CONSENT

The authors certify that the patients have given their consent for their images and other clinical data to be published in the journal. The patients are aware that although every attempt will be made to hide their identity and that their names and initials will not be published, anonymity cannot be ensured.

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